REMARKABLE CASE

OF THE

EFFECTS OF LIGHTNING

ON THE

HUMAN BODY;

WITH

GENERAL OBSERVATIONS

ON THE

NATURE AND PHENOMENA OF LIGHTNING.

ADAPTED FOR GENERAL READERS.

BY JOHN DAVIES,

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TO HENRY COWPER, ESQ.,

OF TEWIN WATER, HERTS;

WHOSE INNUMERABLE ACTS OF CHARITY

HAVE JUSTLY ENTITLED HIM TO THE APPELLATION OF

"FRIEND OF THE POOR;"

AND WHOSE

UNBOUNDED MUNIFICENCE

IN SUPPORT OF THE

GENERAL INFIRMARY AT HERTFORD

HAS BEEN THE MEANS OF ESTABLISHING THAT

USEFUL INSTITUTION

UPON A FIRM AND SECURE FOUNDATION,

THE PRESENT CASE,

TREATED AT THE INFIRMARY,

AND THE OBSERVATIONS THEREON,

ARE MOST RESPECTFULLY INSCRIBED,

BY HIS VERY OBEDIENT SERVANT,

THE AUTHOR.

Hertford, October 25th, 1839.

PREFACE.

The leading points of the Case whose history and treatment are described in the following pages have been already published in the *Lancet*, a Medical Journal whose circulation is very extensive amongst the Members of the Profession; but having been solicited to re-publish it in a separate form, the Author feels happy to comply with the request.

The case is remarkable in many points of view, but more particularly so in being one of the most severe of the kind on record where the loss of life was not a consequence of the accident. It is probable that if the electric fluid had been a single grade more intense, death must have been the inevitable and immediate consequence.

The effect of the lightning on the man's mind was also very singular. Long after the external wounds had healed, the mind still continued in a puerile state, like that of a child just beginning to take notice of external objects. The memory seemed to waver in doubt respecting things which had long been most familiar to the patient; but as the general health and strength continued to improve, the mental powers also made some progress towards recovery, and were ultimately restored to their former condition.

Persons who are acquainted with external injuries like those attending the present case, will readily perceive that the Sur-

gical treatment here adopted differs very materially from the common method used in cases of a similar nature. The Author hopes that the example now afforded, as well as the numerous facts adduced in a work lately published by him, entitled "SELECTIONS IN PATHOLOGY AND SURGERY," will be the means of directing the attention of the Profession to a plan of treatment in local affections, which the experience of eleven years in its use, both in Infirmary and in private practice, has proved to be so very superior to the usual methods.

But the fortunate issue of the present Case is also greatly attributable to the conveniences afforded by a public Infirmary; for, even under the most skilful treatment, injuries of so extensive a nature stand but a very distant chance of a favourable termination amidst the filth and confinement of a poor man's cottage.

As the case of Mr. Cannon, of which mention is occasionally made in the following pages, did not come under the Author's care, he abstains from offering any remarks upon it, and merely alludes to it as an auxiliary illustration of the effect of lightning on the body.

REMARKABLE CASE, &c.

The month of June of the present year (1839) was noted for its numerous thunder-storms, which occurred in almost all parts of England; and it is hardly in the memory of any one to have heard of so many and such serious accidents from the descent of the electric fluid to the earth. In Hertfordshire particularly these meteorological convulsions were witnessed almost daily upon an extensive scale; and several instances occurred where trees of great magnitude, which had stood their ground for many scores of years, if not for centuries, were shivered to splinters, and scattered, stem and branches, over the surrounding fields; affording an awful proof to man that a Power rules over the operations of nature, compared with which his own boasted resources are as nothing in the scale.

During one of these violent storms, which occurred on Wednesday, June 26th, between eleven and twelve o'clock in the day, WILLIAM ANCIENT, aged 21 years, together with his master, Mr. CANNON, and Mr. Cannon's son, a boy about eleven years of age, were standing under a large, tall elm tree, which grew in the hedge of an arable field, where they all had been ploughing during the morning, in the parish of Tewin, about five miles from Hertford: they had not stood there many minutes when the tree was struck by lightning, and

when they were all three struck down senseless to the ground.

About two poles off, under another tree, growing in the same hedge, there stood three other persons, and four horses. It appears, from the statement of these persons, that all the horses were knocked down by the same lightning, but that they almost immediately got up and galloped off into the middle of the field, where they stood still, as if taught by their instinct that the open field was a place of greater safety, under such an awful convulsion of the elements, than that sought by man.

The three men felt a very strong shock from the lightning, but were not struck down. After a few minutes had elapsed, they discovered their master, Mr. Cannon, his son, and William Ancient lying on the ground, under the neighbouring tree. The boy soon recovered from the shock, but he was considerably scorched on different parts of the body.

Mr. Cannon spoke to the men who went to him, but he says that he has no recollection of any thing that occurred up to the time of having his wounds dressed, which took place about half an hour after the accident. He was a great deal scorched on various parts of the body; but that which was the most remarkable in his case, was a very deep and extensive laceration of the right heel and sole of the foot, and a round hole about the middle of the outside of the leg, having exactly the appearance of a wound caused by a musket ball. Out of this opening there afterwards was extracted a piece of leather which had formed a part of the right boot. The sole of the foot and heel appeared as if something had forced its way out of the flesh, dragging and tearing the flesh and skin along with it. The scorchings on Mr. Cannon's body were not very deep, though numerous. They were of a copper colour, differing materially in appearance from the usual marks of common fire.

William Ancient, the subject of this case, was standing with his back against the trunk of the tree when he was struck, his master and son being about a yard or four feet in front of him. When discovered he was lying in a state of insensibility in the hedge under the tree. I am informed that he could not move any of his limbs, and that his face and his skin generally were of a dark purple colour. Mr. Dickens, the medical man who first saw him, bled him, and ordered spirit of turpentine to be applied to the burnt parts, which, I understand, was the only medical or surgical treatment he received until brought into the Infirmary.

On Friday, June 28, in the afternoon, William Ancient was brought into the General Infirmary at Hertford. Some degree of reaction had then taken place. There was a slight flush of the face, attended with constant delirium, and rambling, incoherent talk.

As I was from home when the case was admitted, Mr. Towers, the medical resident, applied *tincture of Iodine* to the parts that were most scorched and lacerated, and administered *five grains of chloride of mercury, followed by a simple saline mixture. The chloride of mercury was repeated early next morning.*

Saturday, June 29, Eleven A.M. The patient presented the following symptoms: on the right side of the head, above the ear, there were three or four patches where the hair had been removed close to the skin, presenting exactly the same kind of appearance as if it had been shaved, without causing any injury to the skin itself. There were several scratches and marks of scorching about the face, sides of the neck, and shoulders: the back of the neck was free from any marks. There was a broad path, about eight inches in width, extending all the way down the back, from the lower part of the neck, between the shoulders, to the bottom of the trunk. The skin throughout this extent was very deeply burnt, more especially towards the lower part. In front

there was a similar path, equally wide and severe, extending from the throat down to the lower part of the body. Towards the lower part of this course the injury was wide-spread, and the burn was very deep and severe. On the upper part of the inside of the right thigh there was a spot, about four inches long by about two wide, where the life of the part was very deeply destroyed, presenting a black, charred appearance, as if it had been for some time exposed to the action of a red hot iron. Each thigh and leg had a red or copper colour path both inside and out, varying in width from three to five inches, and extending from the hip and groin, on each side, down to the ankles. Along these courses the injury appeared comparatively superficial, with the exception of a spot here and there, where the skin was more deeply burnt. There were several isolated spots and scratches on the sides of the body, as well as on the front and back parts of the thighs and legs, out of the course of the regular paths already described. The right ankle and foot exhibited a great many bruisings and scorchings; but what rendered the case very remarkable, like that of Mr. Cannon, was a deep hole in the centre of the left heel, as if a musket-ball had made its exit there. The whole foot was of a dark, livid colour.

The patient was perfectly delirious, and unconscious of what was going on around him. He could with difficulty be made to understand the order to put out his tongue. He was constantly talking incoherently about his companions and his farming affairs, and his eyes wandered about and looked dim and vacant, as if he could not see things about him, although we had reason to believe that he could distinguish objects. His face was slightly flushed, and of a temperature somewhat above the natural standard; but the extremities, as well as the body generally, were rather colder than natural. The pulse was eighty in a minute, and every beat com-

municated a peculiar tremulous, long-continued feel to the finger. All the evacuations escaped involuntarily; the bowels were relaxed, and the excretions were of a very dark colour.

I painted over every part that presented any injury (which embraced nearly the whole surface of the body) *with tincture of Iodine, of a strength of one scruple of Iodine to an ounce of rectified spirit of wine; and the remedy was made to insinuate itself freely into the opening in the heel.* This was the only external application that was had recourse to now. He was ordered to take *two grains of chloride of mercury every four hours, to be followed two hours after by a drachm of wine of potassio-tartrate of antimony in solution of citrate of soda.*

In the evening he was much the same, but less flushed in the face, and the extremities were rather colder than in the morning. The vital powers seemed altogether more depressed. He was ordered to *continue the chloride of mercury*, and instead of the common saline with the wine of antimony, he had *ten grains of sesquicarbonate of ammonia, in two ounces of camphor mixture, every three hours.* He was also ordered a little wine and water occasionally.

30th. Eleven, A.M. He was reported to have been unruly and noisy in the night, which was attributed to the wine and water he had taken in the evening. He had continued the mercury, as well as the ammonia mixture, regularly. He was reported to have been quiet, and to have slept occasionally, since five in the morning. He was now in a more favourable state than the day before; his face was not so flushed; there was a natural warmth all over the body and extremities; the features and eyes looked more lively and intelligent; he readily put out his tongue when told so to do; the tongue was moist, and almost clean, whereas the day before it was brown and dry; he could give rational answers to simple questions, although he still manifested

symptoms of delirium, by talking incoherently when left alone; he had no idea of his situation or condition; he seemed conscious of the escape of his evacuations, though he still allowed them to pass in the bed; he complained of hunger; his pulse was sixty, sufficiently strong, but characterised by a tremulousness of the beat, as already mentioned. The scorched integuments were beginning to slough on the back and on the front of the body, and the wound in the heel presented a clean, healthy appearance about the edges. *The tincture of iodine was repeated over all the injured surface, and the hole in the heel was well filled with it.* No further dressing. As the mouth was slightly affected, the mercury was discontinued, but the *ammonia, in camphor mixture, was ordered to be continued.*—To have arrow-root, and broth with some bread in it.

July 1. Eleven, A.M. All the general symptoms were a grade more favourable, but none had entirely disappeared. The dead parts had entirely sloughed off, both on the back and front of the body, leaving a clean, healthy, purulent secreting surface. About the neck, shoulders, thighs, and legs, where the injury had been more superficial, the skin was beginning to peel off. There were, however, here and there, about the thighs and ankles, a few black spots, where the integuments were dead, which had not cast off their slough. *These, as well as the wound in the left heel, were again well painted over with the tincture of iodine; the raw surfaces on the back, chest, and belly, were sprinkled over with finely-powdered chalk, and simply covered with dry lint. The ammonia was discontinued, and a simple saline mixture substituted for it. He was ordered two grains of chloride of mercury immediately, and two at night,* as the evacuations, though liquid, were very dark in colour.—Diet the same as before.

2nd. The general symptoms were still improved a grade, but the delirium was not entirely gone. He

seemed conscious of the impropriety of passing his evacuations in bed, yet he could not control himself in that respect. The pulse was about sixty, and had the same tremulous character as before; the tongue was moist and clean, and the mouth continued very slightly affected by the mercury. There was no particular heat about the head; the evacuations were liquid and dark-coloured; the raw surfaces were healing fast; there was only one spot (on the inside of the right thigh) which had not cast off its slough. *This, as well as the heel, was touched with the iodine; the back and belly were again sprinkled over thickly with powdered chalk; the saline was ordered to be made with infusion of calumba instead of water.*—Diet of broth, bread, and arrow-root.

In three days more the whole of the external injury was either healed or scabbed over by the action of the chalk, except the spot inside of the right thigh, and the opening in the left heel. *The former was touched daily with the tincture of iodine until the slough was thrown off.* When the separation of the dead part took place, a deep ulcer presented itself, which, together with the heel, was occasionally touched with the iodine, until both healed up.

From lying on his back in one position for so many days, and from the impossibility of his being always kept dry, slight sloughing took place on the lower part of the back, which rendered it necessary to transpose him to a hydrostatic bed. Having been so transposed the ulcer soon healed up.

Ancient had not been above ten days in the Infirmary before all his external wounds were healed up, except the two points last mentioned, although the injury had been very extensive and severe. The thigh and heel, also, recovered very rapidly under the use of the iodine.

But the recovery of his mind did not keep pace with

that of his body. When brought in, as already stated, he was in a state of complete delirium, and unconscious of every thing about him. In three or four days, however, he *began* to take notice of things, and his intellect seemed to improve a *little* every day. Even towards the end of July he did not remember the name of his master; he called the nurse "mother;" he did not recollect the name of his parish, but when told it, he remembered the names of some of its inhabitants; he constantly forgot where he was, although told every day that he was in the Hertford Infirmary; and his mind exhibited altogether more the character of the mind of a child just beginning to take notice of external objects, than that of a man arrived at the age of maturity.

ANCIENT was discharged from the Infirmary on the 22nd of August, having been blessed by PROVIDENCE with the restoration of his intellect to its former state, as well as with a perfect recovery from his bodily injuries, with the exception of general debility.

The clothes of both Mr. CANNON and his man presented a very remarkable condition. The former had on a sort of fustian jacket; it was torn to rags; so was the back of his waistcoat; both his stockings were slit from top to toe. He had on laced boots, such as are usually worn by farmers; they had in them large nails, and iron tips under the heels; one-half of the upper-leather of the left was torn from the sole and carried away. The right boot, which covered the injured foot, had all the upper-leather torn off, with the exception of a small slip, less than half-an-inch wide, which held it to the heel. The sole of the boot was split all the way from the heel to the toe; the iron tip under the heel was carried away by the lightning.

ANCIENT's clothes were all in rags: only the brim of his straw hat could be discovered; and a cotton handkerchief, which he had in the hat, was found some distance off, torn to pieces. His jacket, waistcoat, shirt, small-

clothes, and stockings, all presented a heap of rags. He had on boots similar to those of his master; the left one, which covered the injured foot, had a hole right through the heel, corresponding to the hole in the man's heel; the edges of the opening looked charred, as if burnt with a hot iron.

It was said that ANCIENT's clothes were partly on fire when he was discovered, but I could find no marks of fire on any of them, except that on the heel of the left boot as just described.

The tree under which ANCIENT and his master stood was the tallest of a group of about a dozen. It stands on the gentle acclivity of a long, narrow, and by no means deep valley, which runs about north and south. The storm came in the direction from south-west to north-east, obliquely over the opposite ridge of hills; and there were no trees of any height directly in its course until it arrived at the group of which that struck by the lightning was one. The branches of the tree were not injured, but the epidermis or outer bark of the stem was grazed in irregular lines on the side *opposite* to that facing the storm. The side fronting the storm was covered with ivy, which did not present the mark of any injury.

The tree under which the other three persons stood, with the horses, is next in height to that which covered Mr. CANNON, his son, and his servant. It stands twelve paces southward of the other, so that the influence of the lightning must have extended to a considerable distance from the point where existed its greatest intensity. This tree presents no marks of injury from the electric fluid.

OBSERVATIONS.

In the works of Creation we discover a regular chain of dependencies, which sufficiently proves that all were taken into the estimate in the original design for the establishment of the universal system. Electricity forms one link in this great chain, and, like other physical agents, it is intended as a means to an end. In the wide field of natural causes, it appears to be one of the most active as well as the most generally distributed; for, so far as our limited knowledge extends, it seems to pervade matter universally.

Electricity may be exhibited in miniature by rubbing a stick of sealing-wax, or a common glass phial, with a piece of dry woollen cloth. Having been thus excited, the stick of wax or the phial will immediately show that some active, invisible agent has been let loose and put in motion, by its power of alternately attracting and repelling small fragments of paper, or other similar materials, brought within the sphere of its electrical influence. By the aid of an artificial machine, the same agent may be exhibited upon a wider scale, and its intensity may be thus rendered so great as to be sufficiently powerful to destroy the lives of even the larger animals.

But any quantity of the electric fluid which human art is able to accumulate, is as nothing compared with that brought into play on the field of Nature. This favoured country has providentially escaped, for thousands of years, the mighty convulsions which tear up the very foundations of some other lands, in the various forms of water-spouts, earthquakes and volcanoes; and even the electrical phenomenon of lightning, however awful it may at times be, is not often

witnessed here in that degree of violence observed on some other parts of the globe; for, owing to our insular situation, our peculiar position on the surface of the globe, and other causes of a meteorological nature, a great quantity of the superabundance of electric fluid in the atmosphere is brought down in combination with the falling rain, before the storm bursts out in full violence.

I wish any thing I could urge here might serve to deter persons from resorting to the cover of trees during thunder-storms. A moment's reflection upon the laws which govern the operation of lightning must satisfy every one, even if examples were wanting, that great danger is incurred by such a practice. And it unfortunately happens that the tree which is most capable of affording protection against the rain is the one most likely to be struck by the lightning; inasmuch as it is generally the tallest among its companions. That was the case in the instance of Mr. Cannon and his men.

It is probable, as already stated, that the electric fluid pervades all parts of this globe and its dependencies. Its great tendency is to diffuse itself *proportionately* throughout the material world; but as various causes serve to disturb its equilibrium, that is, its equal distribution, some bodies become overcharged with it, while others contain less than their due proportion. When that is the case, there is a constant effort going on in the overloaded body to discharge a portion of its electricity to those bodies which have less than their due quantum, as well as in the latter to *acquire* a portion of the superabundance of the former. The equal distribution cannot be established unless the bodies which are dissimilarly electrified are brought within a certain distance of each other. Now, previous to a thunder-storm, the atmosphere is overloaded with electric matter. The superabundant moisture in the air is gathered together into clouds, and these clouds, being denser than the atmosphere generally, draw to themselves a large portion

of the surrounding electricity. As the clouds form, and approach each other, there is a constant discharge of electricity from those which contain *more*, to those which contain *less*, of the electric fluid; thus exerting an unceasing effort to restore the equilibrium of the whole. This is the cause of that well-known and splendid phenomenon called "sheet-lightning." Lightning generally amounts to nothing more than sheet-lightning, for after passing repeatedly from cloud to cloud, so as to attempt to establish an equal diffusion, the superabundance of electric fluid spends itself, by its gradual descent to the earth in combination with the drops of rain.

But when a surcharged cloud is situated low or near the surface of the earth, and when it is almost solitary and its constitution very dense, the probability is that it will discharge its undue quantity of electric fluid towards the earth, so as to cause what is called a "thunderbolt," or "fork-lightning," that is, a lightning falling from the cloud to the earth, instead of passing from one cloud to another. As the atmosphere is a bad conductor of electricity, the electric fluid catches hold of any object in its way from the cloud to the earth which is capable of conveying it to the end of its journey quicker than it could travel through the air. A high tower or other building, or a high tree, serves the purpose of a rapid conductor, and is generally made use of by the lightning before it arrives at the ground. This shows the extreme danger of being near such an object during the violence of a thunder-storm.

Heat and light, whether one and the same thing or not, are never found separate in Nature. We find the same properties connected with the electric fluid. So intense is the heat of lightning that we find it occasionally not only convert the hardest metals into a fluid state, but it even dispels them altogether into vapour. Upon a smaller scale, the same effect may be artificially

produced by that form of electricity called galvanism; for a thin metallic wire will be immediately fused and sublimated under the influence of a powerful galvanic battery.

Taking these facts into consideration, it might be expected that objects would be more oftenly set on fire by lightning, when struck, than they really are. Now and then a rick, or some other highly combustible material, is ignited by the electric spark, but unless the object struck be of a very combustible nature it is not often that it takes fire. The injury in general is of a mechanical kind when the lightning comes in contact with inanimate bodies; for trees and other elevated objects are usually barked or shattered, and thrown about in all directions, and are comparatively seldom ignited.

Moreover, it is frequently observable that the ground is torn up and scattered about where the lightning comes in contact with the earth, whether it strikes the spot originally or is conducted to it by a tree; thus proving pretty satisfactorily that the electric fluid, however subtle, is still a material substance, which occcupies space and possesses other qualities of matter.

To show, however, the peculiarity of electric heat, and to distinguish its properties, both mechanical and chemical, from those of other promoters of caloric, we have only to point at its effects upon Ancient and those who suffered with him. Although the clothes of these persons were made of combustible materials, yet they did not take fire. They were torn to rags, and some of them scattered about to a great distance. It was at first stated, as already noticed, that Ancient's clothes were burning when he was found in the hedge; but, upon further enquiry, and upon a strict examination of the clothes themselves, it is positive that such was not the case, and that the effect of the lightning upon the clothes was entirely mechanical.

But how did it occur that the body, situated *under* the

clothes, was so severely burnt, while the clothes themselves escaped combustion? There was scarcely a part of the body or of the lower extremities that was not more or less scorched, and the injury was very deep in general over those parts. The fact appears to be, that the electric fluid possessed a stronger attraction for the animal body than for the clothes, which were for the most part composed of vegetable materials, such as flax and cotton. The lightning seems to have passed down between the clothes and the body, and whilst it scorched the latter all along its course, it burst out and tore the former without setting fire to them.

It has often occurred that metallic substances, such as money, keys, &c., have been melted in a person's pocket, by the lightning, without the clothes taking fire, or himself suffering any injury. A circumstance of this kind appears extraordinary until the laws which govern the electric phenomena are explained; but when these are understood, the mind is led to contemplate with admiration the unerring uniformity which subsists in the order of causation, and no one who possesses a mind can help recognising in these laws a pre-existing contrivance—an INTELLIGENCE—beyond human conception in its comprehensiveness.

In the various forms in which matter exists, we find that each form has an attraction or affinity for other forms, and these vary in degree according to the elementary constitutions of bodies. This law is so uniform in its operations, that we might say that bodies cannot help acting as they do, unless their properties should be altered by the same infinite Power which first ordained them to be as they now are. It is this uniformity in the laws of Nature that constitutes the foundation of the little knowledge which man possesses. He finds that the natural flow of a current is always from a higher towards a lower ground; and that a wheel, or other circular body, let loose on the top of a hill, will always

roll towards the bottom, and never from the bottom towards the top. The same principle holds good in every department of matter: when the same causes are brought to bear upon one another, the same effects will as inevitably happen as that the tendency of a body thrown up into the air is always back towards the earth.

Electricity, then, like other modifications of matter, varies in its degree of attraction for different bodies; and it will approach and join bodies for which its attraction is stronger in preference to those for which it is weaker, when the distance towards each is the same. Now, of all known substances, the metals are those for which the electric fluid exerts the strongest attraction, and it will fly from a considerable distance to join them, and forsake other forms of matter. It is upon this principle that lightning protectors are constructed; for, by making an iron rod to communicate with the ground at one end, while the other end reaches up above the building intended to be protected, the lightning will seize hold of the metallic rod in preference to the building, and will be conducted along it to the earth. A pointed object, like a rod, has also a stronger attraction for the lightning than a blunter object, and especially more so than the top of a building or a tree.

By attaching a metallic attractor to the string of a paper kite, and by connecting the other end of the string with what is called a Leyden jar, the celebrated Dr. Franklin succeeded in bringing the lightning down from the clouds, and to charge the jar with it as effectually as if he had charged it with an electrifying machine; thus proving most satisfactorily that lightning and the electric fluid are one and the same thing.

It often happens that bell-wires, or other metallic substances in a house, are completely fused by the lightning, when the injury done to the house itself is trifling. The walls of the house are much protected by

such means, for the wire draws away the electric fluid from them and conducts it towards the earth.

From these facts, it is clear that the most dangerous part of a house to be situated in during a thunder-storm, is near a bell-wire, or near any other metallic substances; for the chances are that, if the house be struck, those parts will suffer most which afford the strongest attraction for the lightning, and those are substances of metallic composition.

Many persons suppose that the most dangerous parts of a room during a storm are near the fire-place and near a window. There is some ground for such an opinion; but the increased danger does not arise, as is supposed, from the lightning running down the chimney, or coming in at the window. So far as that is concerned those places would be the safest in the house, for the electric fluid will not penetrate glass, so that it cannot enter at the window if the window be shut; and as the chimney is always full of atmospheric air, and air being a bad conductor of electricity, it is very unlikely that the lightning would run down the chimney. But the danger of those places arises from two different causes. About the fire-place there is usually a considerable quantity of iron, forming the grate, poker, tongs, &c., so that the lightning is attracted by these from the wall along which it descends towards the earth; and, which is still a stronger cause, the bell-wire generally terminates near the fire-place, so that the electric fluid discharges itself from the point of termination of the wire, either in a direct line towards the ground, or else in an oblique current towards the grate and fire-irons; thus rendering such a situation highly dangerous. The risk of being situated near a window is not so much that of being struck by the lightning, as of its occasioning a *loss of sight*. The electric light, in an accumulated quantity, is so intense that, in many cases, it has instantly destroyed the function of the optic nerve, which

forms the immediate organ of vision. Similar effects have been caused by looking at the sun with the naked eye. The retina of the eye is adapted for only a certain degree of light, so that any refulgence suddenly applied to it is calculated to produce instant blindness.

The safest place in a house during a storm, doubtless, is the cellar, for the chances are that the lightning will disperse itself in the ground before it arrives at that part of the house, unless there be some metallic substances to conduct or to attract it there.

Having taken this general view of the properties of lightning, we shall now be able to understand why the feet of Mr. Cannon and Ancient should have suffered so severe an injury.

It has been already stated that the sole of one of Mr. Cannon's boots was split from one end to the other, which was that of the foot that suffered the injury; and that the iron tip under the heel had been carried away by the lightning. It has been also mentioned that one of Ancient's boots had a hole forced through the heel, corresponding to the deep hole inflicted in his own heel. These facts are accounted for by the circumstance of the boots of each of them having had so much iron in the soles. The large nails with which they were studded, and the iron tips, exerting a very powerful attraction on the lightning, caused such an accumulation of electric intensity at the bottom of the feet as to lacerate them in the manner already described. Had the boots been off, or had they been void of nails and other metallic substances, there would have been less reason why the feet should have suffered than other parts of the body, because the lightning, being then so near the earth, would have readily passed into the ground.

The limits prescribed for this little pamphlet will not permit this interesting subject to be followed out to the extent it might be carried, otherwise many additional facts might be adduced in illustration of the phenomena

of lightning. A reason might be assigned for the fatal effects it occasionally produces without leaving any external marks of violence; for the condition of the body after such an accident; for its action on the brain, so as to occasion mental derangement, like that in Ancient's case. The cause of the atmosphere acquiring an undue proportion of electric matter might be also enquired into; its accumulation in certain localities, so as to produce storms, whirlwinds, &c.; the phenomena of thunder, in connection with the discharge of the electric fluid among the clouds; the cause of the condensation of the aqueous vapour of the atmosphere into drops of rain, &c.; but all these points, and many others, must at present be omitted.

It may be noticed, in conclusion, that although trees readily transmit lightning in its passage to the earth, yet wood is, upon the whole, an indifferent conductor of electricity. In its recent condition, however, and especially if rendered wet by the rain, the electric agent exerts a stronger attraction for it than in its dry state. While growing, the woody fibres are saturated by the sap, which affords a ready transmission to the electric spark, and it need hardly be repeated, that it is highly dangerous to remain under a tree during a thunder-storm, because numerous fatal proofs, within the knowledge of most persons, sufficiently verify that fact.

FINIS.

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